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BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program (D.13-10-040, D.14-10-045) and related Action Plan of the California Energy Storage Roadmap.	Rulemaking 15-03-011 (Filed March 26, 2015)

SOUTHERN CALIFORNIA EDISON COMPANY'S (U 338-E) OPENING COMMENTS ON ASSIGNED COMMISSIONER AND ASSIGNED ADMINISTRATIVE LAW JUDGE'S SCOPING MEMO AND RULING SEEKING PARTY COMMENTS

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I.

INTRODUCTION

Pursuant to the California Public Utilities Commission's ("Commission") Rules of Practice and Procedure and the Assigned Commissioner and Assigned Administrative Law Judge's Scoping Memo and Ruling Seeking Comments dated January 5, 2016 ("Scoping Memo"), Southern California Edison Company ("SCE") hereby submits its comments on Track 2 Issues. The Scoping Memo for Track 2 identified a number of important issues for the continued development and refinement of the Energy Storage Procurement Framework, and solicits parties' comments on many topics, including procurement targets, multiple use applications, station power, and community storage. In these comments, SCE responds to each of the questions posed in the Scoping Memo as follows:

- The Commission should revise the energy storage targets to establish uniform targets for all Load Serving Entities ("LSEs"), including the investor-owned

utilities ("IOUs"), Direct Access ("DA") Energy Service Providers ("ESPs") and Community Choice Aggregators ("CCAs").

- Once targets are equalized for all LSEs, the Commission could equitably allocate the costs and benefits of energy storage procurement done by the IOUs on behalf of the system.
- The Commission should not increase the energy storage targets for the IOUs at this time.
- The Commission should not adopt new energy storage procurement targets beyond 2020 at this time.
- The Commission should include "V1G" or controlled electric vehicle charging as an eligible storage resource.
- The Commission should encourage the development of multiple-use applications that may enhance the value of energy storage and provide increased value to customers and the grid. Although many policy issues must be resolved to ensure that new multiple use applications are successful, SCE is eager to collaborate with the Commission and stakeholders to develop solutions to these issues. SCE strongly supports joint workshops with the California Independent System Operator ("CAISO") to address the complexities associated with multiple-use applications.
- SCE proposes that auxiliary station loads should be served from a separate retail meter and billed at retail rates, and "baseline" inverter and transformer loads which exist during all hours (regardless of operation) should also be treated as retail load.
- There are many definitions of "Community Storage" and many similar questions to those encountered with multiple-use applications. SCE looks forward to working with the Commission and stakeholders to resolve these questions.

II.

RESPONSES TO QUESTIONS IN THE SCOPING MEMO

A. Revision of Energy Storage Procurement Targets

1. The Commission Should Revise the Energy Storage Targets to Establish Uniform Targets for All Load Serving Entities

The Scoping Memo asks whether the Commission should revise the targets for the IOUs and/or ESPs/CCAs for the 2018 and 2020 solicitations.[1] SCE supports modifying the targets so that all LSEs, including IOUs, ESPs, and CCAs, have the same procurement obligation determined as a percentage of peak load.

Currently, the ESPs/CCAs have a target of 1% of peak load, whereas the IOUs' targets range from 2.5-3% of peak load. In Decision ("D.") 13-10-040, the Commission set higher storage procurement targets for the IOUs than for ESPs/CCAs because ESPs/CCAs "will be required to pay certain non-bypassable charges that may be used by the IOUs to develop energy storage systems."[2] The Commission recognized that the IOU target is greater than the ESP/CCA target, but reasoned that the IOUs would be allowed to count certain projects that would be paid for by all customers, both bundled and unbundled. However, as discussed below, this mismatch between targets has proved both confusing and contentious, with ESPs and CCAs arguing that they should be given credit for energy storage funded by IOU programs but deployed by their customers.

For example, the recent Track 1 OIR Decision[3] modified the counting rules to require that for energy storage projects installed by customers of a CCA or ESP, credit for the SGIP-

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1 *See* Assigned Commissioner and Assigned Administrative Law Judge's Scoping Memo and Ruling Seeking Party Comments ("Scoping Memo") at 5 (*available at* http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M157/K541/157541764.PDF).

2 D.13-10-040 at 46.

3 D.16-01-032.

funded energy storage projects should be split evenly between the unbundled customers' IOU and the CCA/ESP. However, the Decision failed to address how this 50/50 credit split is consistent with D.13-10-040 which justified the disparate targets based on the IOUs ability to count 100% of SGIP projects towards their targets. With uniform targets, the Commission could develop a clear and equitable allocation method for all LSEs that better reflects their respective contribution and procurement of resources. Similarly, as discussed below, establishing uniform targets could provide a foundation for resolving ongoing issues related to stranded cost recovery.

In order to clearly ensure customer indifference as well as to simplify the need for additional policy "work-arounds," SCE recommends the Commission revise the targets framework to simply establish uniform targets applicable to all LSEs.

2. Once Targets are Equalized for All LSEs, the Commission Can Equitably Allocate Both the Costs and Benefits of Energy Storage Procurement

The Scoping Memo asks parties to comment on the implications for stranded cost recovery if increased targets are adopted for ESPs and CCAs.[4] Equalizing the targets between the IOUs and ESPs/CCAs could help to facilitate a more equitable allocation of the costs and benefits of energy storage amongst all LSEs, and eliminate contentious litigation of cost allocation issues.

As noted in its comments on Track 1 issues, SCE understands the concern voiced by ESPs and CCAs that their customers will pay more than their fair share for storage. SCE has the same concern for its customers. Because the storage targets for IOUs are a set MW target while the targets for ESPs and CCAs are set as a percentage of peak load, it is very unlikely that the procurement of storage (and the costs associated with that) will be equitable across entities. This difference is further exacerbated because the IOUs' MW target is a larger percentage of peak load than the percentage used for ESPs/CCAs, and the new 50/50 allocation of SGIP projects

[4] *See* Scoping Memo at 6.

deployed by ESP/CCA customers, doesn't reflect any of these propositions. Based on the disconnect between the LSEs' respective targets and the credit allocations, either the IOUs' bundled customers or the ESPs' and CCAs' customers will pay for a higher proportion of energy storage under the existing storage procurement framework. As of now, it is not possible to determine who will ultimately "win" or "lose."

The Commission should not focus on one partial aspect of the energy storage procurement framework to determine whether costs are allocated equitably. Instead, SCE suggests that the Commission consider moving to targets that are based on the same percentage of peak load for all LSEs, and then pro-rating the credit for storage projects that are paid for by the customers of all LSEs.[5] Such an approach would ensure equitable goals, and that all customers, bundled and DA/CCA customers alike, will share equally in both the costs of, and credit for, energy storage procurement. A similar allocation of benefits and costs could be developed and applied to stranded costs for generation function storage. As discussed above, a uniform target framework would be a necessary element to any simple allocation of both storage cost and storage credit if the underlying energy storage project was paid for by all customers.

3. The Commission Should Not Increase the Energy Storage Targets at This Time

The Commission established procurement targets to support the goal of market transformation.[6] Therefore, in assessing revisions to the targets, the Commission should consider whether adequate progress is being made in transforming the energy storage market.

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[5] Such a mechanism would work much like the allocation of the Resource Adequacy credit associated with generation that is procured on behalf of all delivery customers to sustain system and local area reliability.

[6] *See, e.g.*, D.13-10-040 at 7 (stating that the Proposed Plan set procurement targets with the goal of market transformation, and that "although the Proposed Plan suggested procurement targets through 2020, the long-term goal would be to eliminate targets when the storage market is more mature, sustainable, and able to compete to provide services alongside other types of resources."); *Id*. at 73 Conclusion of Law 5 ("It is reasonable to set procurement targets to encourage the development and deployment of new energy storage systems.").

To date, all available evidence suggests that the market is indeed transforming. In fact, the pace of transformation is occurring much faster than expected. All three IOUs have complied with their first biennial procurement targets, and SCE is well ahead of the pace required by the targets.[7] Collectively, the IOUs have procured a large, diverse set of storage technologies representing a number of different applications. While additional opportunities remain to develop new applications, the current storage procurement program *is succeeding beyond expectations* in driving the storage market forward. Therefore, there is no reason to increase targets at this time.

Further, as the Commission is aware, there are many other proceedings involving Distributed Energy Resources ("DERs"). Unfortunately, most of these proceedings are occurring in silos and do not result in the development of an optimized DER portfolio facilitated by a modern grid that is designed and operated to maximize the benefits of such DERs. SCE believes that the Commission should be increasingly mindful of the various interactions among these proceedings and take a holistic approach rather than increasing targets for procurement of specific DER types such as energy storage. For example it is very likely that in the Distribution Resources Plan ("DRP") proceeding, conventional distribution infrastructure deferral will trigger a need for additional DER products and services, many of them provided by energy storage resources. This would result in energy storage deployment unrelated to and not dependent upon procurement targets in this proceeding. It is preferable for the Commission to predict, track and monitor such developments, before increasing energy storage procurement targets.

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[7] *See* R.15-03-011, Report of Southern California Edison Company Demonstrating Compliance With Energy Storage System Procurement Targets and Policies (January 4, 2016); SDG&E's 2014 Energy Storage Distribution Reliability/Power Quality Request for Proposal Seeking a 4 MW Energy Storage System: Post Solicitation Report (December 1, 2015); R.15-03-011, Report of Pacific Gas and Electric Company Demonstrating Compliance With Energy Storage System Procurement Targets and Policies (January 4, 2016).

If the Commission nevertheless considers raising the targets at this time, the Commission should first identify what specific policy objectives warrant a mid-course increase to the targets, and why such objectives are not being met with the current targets.

4. The Commission Should Not Adopt New Energy Storage Procurement Targets Beyond 2020 at This Time

The Scoping Memo asks whether the Commission should adopt energy storage targets beyond 2020.[8] SCE believes that it is premature to implement new energy storage procurement targets beyond 2020 at this time and that any additional procurement obligations should be based solely on defined system need. Various studies have indicated that with renewable power generation at 50%, additional energy storage may be required to manage the renewable generation. However, to date, there have been no findings of need for additional flexibility in the current 10 year planning horizon. If and when such formal findings occur, it would be appropriate to consider technology-neutral solicitations, in which storage and other resources could compete to provide system flexibility.

If the Commission considers extending the storage procurement targets for any reason other than meeting a defined system need, the Commission should clearly indicate the purpose and objective of any additional mandates.

B. "V1G" or Controlled Charging Should Be Included as an Eligible Energy Storage Resource

The Scoping Memo asks whether new information and/or evolving circumstances exist such that the Commission should revisit previously excluded energy storage technologies.[9] SCE continues to support a diverse storage marketplace in which all storage technologies may

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[8] *See* Scoping Memo at 5.
[9] *See* Scoping Memo at 6.

compete to provide the greatest customer value. Expanding the universe of eligible technologies will increase opportunities for LSEs to select projects that maximize benefits and minimize costs.

In particular, SCE recommends that "V1G" (*i.e.*, controlled electric vehicle charging) be included as an eligible storage resource. Controlled charging has the potential to be a large-scale solution (*e.g.*, for oversupply and ramping challenges[10]) and provides an important additional resource to provide flexibility and greenhouse gas ("GHG") reductions. However, controlled charging is not developing as fast as other storage technologies. Consequently, this technology is appropriate for inclusion as part of the Commission's Energy Storage Procurement Framework designed for market transformation. By making controlled charging eligible for storage contracts in this proceeding, the Commission can provide a clear signal to the market and the opportunity to realize V1G's potential as a large-scale solution. If made eligible, this clear market signal will also help the Commission address implementation issues in the Alternative-Fueled Vehicles OIR[11] and will provide innovation in the charging services market (similar to what has occurred with stationary storage devices). Finally, the grid benefits achieved through aggregated vehicle charging may potentially be realized at competitive cost. Because Electric Vehicle ("EV") drivers have already purchased the battery and charging stations, securing grid services from EVs may be an economically attractive energy storage option.

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[10] *See* E3 Higher RPS Study Briefing for PEV Collaborative (March 11, 2014) at 9-12 (available at http://www.pevcollaborative.org/sites/all/themes/pev/files/Ryan_PEVC%20Presentation%20Nancy%20Ryan%20E3.pdf).

[11] *See* Rulemaking 13-11-007.

C. Multiple Use Applications

1. SCE Encourages Development of Multiple Use Applications That May Enhance the Value of Storage and Provide Increased Value to Customers and the Grid

SCE looks forward to collaborating with the Commission and other stakeholders to develop new multiple use storage applications that provide value to the grid while reducing costs to customers. As the Ruling's extensive list of questions indicate, there are numerous policy issues that must be resolved to ensure these new applications are successful. While many of the questions will require significant additional work to resolve, in the responses that follow, SCE identifies key points of focus that will aid in addressing the various questions. In particular, the responses highlight key needs to ensure that the benefits of multiple uses are achieved, while avoiding the pitfalls suggested by some of the Commission's own questions such as improper double payments or improper cost shifting. SCE looks forward to actively participating in workshops on these topics to develop solutions to enable these new applications.

2. Multiple Use Cases that Currently Exist, or May Exist in the Future

The Scoping Memo asks for parties' input on which energy storage use-cases currently exist, or may exist in the future, as well as specific regulatory issues that will need to be resolved concerning multiple-use configurations.[12] At present, SCE has seen interest in dual-use applications, *e.g.*, the ability of a customer to utilize energy storage to offset demand charges while also providing demand response to the California Independent System Operator ("CAISO"). During CAISO stakeholder discussions on this topic, a key topic centered on the metering necessary to identify whether both services have been provided. These discussions have led to the CAISO developing revisions to the baseline methodology and examining the use

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[12] *See* Scoping Memo at 6-7.

of a meter behind the retail meter to determine what actions the resource has taken. In addition, during this process, demand response resources that are not supported by battery storage have asked for similar multiple metering to account for specific loads and the actions taken by those loads. This use of multiple meters is significantly more complicated and deserves attention, as does the general matter of what metering and accounting is necessary to ensure that resources contracted to provide multiple services can be confirmed to have provided those multiple services. Issues relating to demand response measurement are appropriately addressed in the demand response proceeding. However, general questions related to metering and separately tracking wholesale and retail activity (as discussed more in the following section) are appropriate topics for this proceeding.

SCE notes that there are other applications of dual use that are likely to develop in the future. The next most likely dual-use application that will ultimately need consideration is providing distribution reliability services while also participating in the CAISO market (providing energy and ancillary services), and/or Resource Adequacy ("RA"). SCE has deployed a number of pilots and demonstrations of storage providing distribution reliability services exclusively, and is now exploring the option of adding wholesale market participation to increase the value of the storage (and reduce net customer cost). The Commission can help facilitate this form of dual-use storage by addressing cost-recovery and cost-allocation issues between bundled and unbundled customers. Here, the distribution function would benefit all customers (bundled and unbundled) whereas the wholesale function would benefit bundled customers. A new cost recovery framework is necessary to guide the allocation of both the fixed and variable costs (and revenues) of the storage device, to ensure that costs are allocated to the appropriate customer group. SCE recommends the Commission host a workshop to discuss cost recovery and allocation proposals for these dual use projects.

The CAISO has also begun a stakeholder process to discuss such applications but that process has not yet concluded. As the CAISO process moves forward, the same metering concerns mentioned above will require resolution. In addition, the rights and obligations of all

parties (*i.e.*, the CAISO, the Utility Distribution Company ("UDC"), and customers) will need to be clearly articulated. It is easy to imagine a circumstance in which the dispatch preference to address a distribution reliability concern may be in conflict with the dispatch preference to address a market award by the CAISO. In such circumstances, it will need to be clear whether it is feasible to provide those multiple services at the same time and if it is, then what dispatch instructions prevail if a conflict exists. Several of these issues are discussed in greater detail in the sections that follow.

3. Issues Concerning Cost Recovery, Cost Allocation, and Cost Shifting

The Scoping Memo asks how the Commission should address cost recovery, cost allocation, and cost shifting issues related to multiple-use applications.[13] Specifically, the Scoping Memo asks about double-counting, redundant compensation, and potential gaming that could arise with multiple-use applications. While SCE shares concerns that multiple-use applications could give rise to potential gaming opportunities, SCE also believes that the ability to "stack" appropriate value streams represents an important opportunity for storage projects to provide greater value to the grid while improving their own economics and thus reducing procurement cost.

An energy storage device that provides two different services – even if simultaneously – may be eligible to collect two revenue streams. If the two services represent two distinct system needs for which procurement would otherwise need to occur, it would be logical to compensate the storage device for both services. One would expect the combined payment for the single device to offer some savings compared to the status quo payments (to multiple devices), such that customer value is gained through procuring the new multiple use application. Conversely, it is never appropriate to be compensated twice for the same service. The challenge is to develop clear performance standards and tracking mechanisms for each service. For example, a device

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[13] *See* Scoping Memo at 7.

interconnected behind the meter ("BTM") performing permanent load shifting ("PLS") may have its operational impact already embedded in load forecasts, and may have the storage output embedded in the customer's "baseline" load. In this scenario, to be eligible for any additional payment (through RA or demand response, for example), the storage device would have to operate beyond its normal PLS operation.

A key challenge will be to establish whether a device can reasonably be expected to provide multiple services. For example, in some locations, it may be reasonable for a device to satisfy a distribution deferral obligation with the UDC as well as provide RA. There may be times when these services conflict, and this conflict could be rare or frequent depending on local conditions. These are both reliability services, and if a conflict occurs, then one of these reliability services will not be delivered. A key question is whether contractual obligations and potential penalties are sufficient to prevent such conflicts from occurring (by providing incentives for device owners to avoid committing to multiple services when conflicts may arise). Alternatively, it may be appropriate for some initial locational analysis and screening to occur prior to enabling a device to enter into contracts for multiple reliability services (although it is unclear what entity would perform that analysis or make any determination). In either case, if a device can provide multiple reliability services, there is some incremental risk the service may not be provided, and this may require one or both of the service recipients to procure additional services to manage this risk.

Additionally, wholesale services must be separated and tracked separately from retail services. Any device charging at wholesale rates should not be allowed to serve retail load, even if that load is behind the same meter. Again, new metering configurations may facilitate solutions: Potential future sub-metering combined with new billing systems could allow wholesale charging to be "backed out" of retail load, while wholesale discharging is "backed in" to retail load. Such complex accounting systems do not currently exist in automated billing systems today.

Finally, the Commission can and should develop a new cost recovery and cost allocation framework for these dual use devices. Cost recovery and cost allocation for the various services must follow the underlying purpose of each service. That is, the costs of services benefitting bundled customers should be allocated only to bundled customers, while the costs of services benefitting all customers must be allocated to all customers. As noted in Section C.2 above, this is an issue within the Commission's jurisdiction, and the Commission can facilitate the development of these dual use applications by developing clear cost recovery and cost allocation rules.

4. Interconnection Requirements

The Scoping Memo asks whether existing interconnection requirements are adequate to enable energy storage to provide retail and/or distribution services and participate in the CAISO wholesale market.[14] The WDAT provides a clear pathway for wholesale market participation. While review of the WDAT interconnection procedures is subject to FERC jurisdiction, review of Rule 21 would be within scope for purposes of this Rulemaking.[15] Areas of Rule 21 that warrant review with respect to whether modifications need to be made in support of interconnections involving multiple (non-wholesale market) services include:

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[14] *See* Scoping Memo at 7.

[15] Rule 21 Section B.1. "This Rule (Rule 21) describes the Interconnection, operating and metering requirements for those Generating Facilities to be connected to Distribution Provider's Distribution System and Transmission System over which the California Public Utilities Commission (Commission) has jurisdiction. All Generating Facilities seeking Interconnection with Distribution Provider's Transmission System shall apply to the California Independent System Operator (CAISO) for interconnection and be subject to CAISO except for 1) Net Energy Metering Generating Facilities and 2) Generating Facilities that do not export to the grid or sell any exports sent to the grid (Non-Export Generating Facilities). NEM Generating Facilities and Non-Export Generating Facilities shall interconnect under this Rule regardless of whether they interconnect to Distribution Provider's Distribution or Transmission System. *See also* Special Condition 1 of Schedule M requiring the completion of CPUC-jurisdictional Interconnection Agreement in order to receive service under Net Energy Metering.

- Metering and communication requirements for reliable system operation (including review of metering cost responsibility) and appropriate rate treatment;[16]
- Retail vs. wholesale rate categorization of energy imported to storage devices (*see* discussion of this topic in Section 3 above); and
- Review and notification processes associated with changes made to operational characteristics (acting either individually or within an aggregated group) from those studied within the interconnection review process.

Due to the complexity of these issues, SCE supports the Commission holding a joint workshop with the CAISO to address multiple-use application topics, including interconnection and jurisdiction.

5. New Metering and Sub-Metering Configurations, As Well as New Tracking and Accounting Systems, May Be Necessary to Facilitate Multiple-Use Energy Storage

The Scoping Memo asks what specific metering and sub-metering requirements are necessary to enable multiple uses for behind-the-meter ("BTM") storage.[17] As noted above, new metering and sub-metering combinations may be necessary, in combination with new tracking and accounting systems. The key principle here is that any device providing both wholesale and retail services must have these services tracked separately.[18] Such tracking is necessary to

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[16] For example, in D.14-05-033, the Commission ruled that Net Energy Metering generators paired with energy storage devices require a Net Generation Output Meter ("NGOM") on the renewable generator (or non-export protection on the storage device) only if the energy storage device is more than 10 kW in size. In that same decision, the CPUC also placed a limit of six hundred dollars for any related metering costs (assuming a non-complex metering solution could be employed). Consultation between the CAISO and Commission should be made regarding cost responsibility for any additional metering required for bidding into the CAISO market.

[17] *See* Scoping Memo at 8.

[18] Note that participation in a retail program that bids into the ISO market as a proxy-demand resource is still a retail function, with all energy settled at retail rates. This discussion concerns a BTM device participating directly in the market as a wholesale participant, settling energy charges at wholesale prices.

ensure that the device owner is billed or compensated appropriately for each charging or discharging activity. This may require development of complicated new tracking and accounting systems to ensure that energy obtained at wholesale rates is not used to serve retail load, and vice versa. Similarly, it is necessary to ensure that the device is billed for distribution or transmission access appropriately, according to the service being provided. Finally, as discussed above, separate tracking of wholesale and retail activities will ensure that costs are allocated to the appropriate customers who receive the service, either bundled customers or all customers.

6. Defined Rules Concerning Dispatch Coordination and Prioritization Will Need to Be Developed to Enable Multiple-Use Configurations

The Scoping Memo asks how dispatch coordination and prioritization should work for resources that have agreed to provide services to more than one entity.[19] Defined rules regarding prioritization of control will clearly be required in order to effectively manage multiple use applications, especially when these uses include reliability services. However, it is important to note that this concept is not new, and is present even with some of today's "single function" generation devices: any wholesale generator interconnected at the distribution grid (via a WDAT interconnection agreement) may face a situation in which a local distribution reliability condition – a situation invisible to the CAISO – may require the generator to reduce output, potentially contradicting a CAISO dispatch signal. Today, the WDAT provides that the UDC may curtail generation when necessary given a distribution reliability concern, and the WDAT further delineates responsibility for any financial penalties resulting from the CAISO. In the future, interconnection agreements and contracts may provide the specific requirements governing priority and control (and associated financial implications). In the case of today's WDAT resources, distribution reliability events are relatively rare. In the case of a future device contracted to provide distribution deferral through some defined service and also contracted to

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[19] *See* Scoping Memo at 8.

provide RA, the conflict with CAISO dispatches may become more frequent. Inherently, only one service may be given priority, and any service not given priority will thus face an incremental risk that the service may not be delivered. As discussed above, a service not granted priority may require the recipient to procure additional resources to manage this risk.

7. SCE Strongly Supports Joint Workshops with the CAISO to Address Issues Associated with Multiple-Use Energy Storage

The Scoping Memo asks whether the Commission should hold one or more joint workshop(s) with the CAISO to address any of the topics outlined above.[20] SCE believes multiple workshops may be necessary to resolve these numerous, complex issues.

D. Station Power

The Scoping Memo asks numerous questions about station power, such as:

a. What rules or guidelines are needed to distinguish station power from wholesale charging energy taken in by distribution connected storage assets participating in wholesale markets?

b. Are there any rules or guidelines required outside of those developed by the CAISO?

c. What are the rate implications for station power in the context of energy storage?

d. What other issues must the Commission consider in regards to station power and energy storage projects?[21]

Energy storage represents a generation resource similar to other existing natural gas and renewable resources. In order to ensure equitable treatment for all customers with respect to services received and charged, service requirements should be applied equally to all generation resources regardless of technology.

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[20] *See* Scoping Memo at 8.
[21] *See id*.

Currently, all generation customers who receive retail service are charged at retail rate levels for delivered end use load.[22] Energy storage systems have station auxiliary loads that are typical of standard generation resources, which can include fans, pumps, computers, and lighting. SCE proposes these types of station loads be served from a separate retail meter and billed at retail rates. The use of separate meters will ensure the separation of wholesale and retail loads. This approach is consistent with rate treatment for station load for conventional generators.

In addition, energy storage systems also have energizing loads consumed by transformers and inverters when the storage device is neither charging nor discharging. (Note that this is distinct from the efficiency losses inherent in storage devices. Efficiency losses would be considered wholesale load.) Often transformer and inverter loads cannot be grouped with the other types of station loads described above, and therefore are located behind the same meter as the energy storage unit. Although the charging and discharging loads will be treated as wholesale loads, retail rates should apply to end-use load typically comprised of inverter and transformer loads registered when the energy storage unit is in a steady state (neither charging nor discharging). SCE proposes that this specific type of end-use load be established in the testing and commissioning phase of the plant lifecycle, or be determined through an engineering study. This "baseline" end-use load will apply in all hours (regardless of operation.) In reality, actual inverter and transformer loads will substantially increase (potentially by an order of magnitude) during charging and discharging activity. However, only the "baseline" end-use loads should be treated as retail load. The incremental inverter and transformer losses will be treated as wholesale, in the same way efficiency losses are treated as wholesale. Once this end-use load is established, it will be applied as retail energy usage to each monthly bill. Therefore,

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[22] "Delivered End Use Load" is defined as final delivery of electric power that is to be used on site and not to be resold.

the monthly bill would be rendered using an existing rate schedule on which the customer receives service, including the threshold amount representing the inverter and transformer loads.

In the event that this end-use load is already billed with wholesale energy charges, customers will be credited for the wholesale charges and any Transmission Access Charge ("TAC") during the retail billing process.

E. Community Storage

The Scoping Memo asks parties to comment on what, if any, barriers exist to developing distribution-level community storage and whether any policies should be adopted to address those barriers.[23] As an initial matter, SCE notes that the term community storage lacks a precise definition. In SCE's experience, community storage can refer to at least four different discrete applications:

1. Storage located at a distribution feeder that is interconnected directly to the utility distribution grid ("in front of the meter" or IFOM) and operated by the utility for the purpose of distribution reliability.
2. A series of small batteries interconnected BTM at several customer locations within the same local area, aggregated together and operated (in at least some hours) by the UDC. These batteries may be operated to provide customer bill management as well as to provide services to the local distribution grid.
3. Storage interconnected IFOM within a community, and operated to provide services to local customers. This application is promising but is not currently possible, as discussed further below.
4. Storage interconnected BTM on a large campus or military base in which the campus is served via a single master meter. While this is "community storage" in a sense, SCE generally considers this type of storage as customer-sited storage.

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[23] *See* Scoping Memo at 9.

It should be noted that any of these applications could potentially participate in the wholesale market. (CAISO participation raises an entirely separate set of issues, as discussed at length in Section C, above.)

As discussed in Appendix A, in SCE's experience with energy storage, progress is being made to advance applications (1) and (2). While some policy details need to be worked out for these applications, these applications are somewhat similar to existing customer programs (in the case of (2)) or to existing distribution infrastructure (as in the case of (1)). For example, the BTM application could be developed as an extension of the existing SGIP program, which already includes incentives to customers but also some operational requirements for the BTM device.

In contrast, the community storage application described in (3) represents a new, innovative application. This concept offers economic value in theory: Rather than install a number of very small batteries at each house in a community (similar to Application (2) above), a single, larger device interconnected IFOM to the local distribution feeder might offer better value through economies of scale. Currently, there is no mechanism for an IFOM device to provide retail services to customers. In theory, new retail tariffs could be developed to create a "virtual BTM" device, somewhat analogous to the procedure for virtual net energy metering available in the multifamily solar affordable housing program.

SCE supports further exploring this concept. Nevertheless, as with many of the issues raised in Section C, there are potential concerns about subsidies. In this new application, it is important to ensure that the distribution system costs incurred by the storage device are allocated to that device. Similarly, if this IFOM device is also going to provide wholesale services, all of the issues raised in Question 3 would apply here as well. SCE looks forward to collaborating

with stakeholders to resolve these issues. SCE believes that issues raised by this topic are sufficiently complex to warrant discussion at one or more workshops.

III.

CONCLUSION

SCE appreciates the opportunity to provide these comments on the Scoping Memo. SCE looks forward to working with the Commission and other stakeholders to resolve these storage policy issues.

Respectfully submitted,

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Appendix A

Summary of SCE's Experience with Community Storage

Summary of SCE's Experience with Community Energy Storage

This Appendix provides brief summaries of SCE's experience in four distinct community storage applications, organized under two different projects.

Irvine Smart Grid Demonstration ("ISGD")

This section describes three distinct community storage applications developed as part of ISGD.

Residential Energy Storage Units

Note: This is an example of application (2) as described in Question 5.

The Residential Energy Storage Units ("RESUs") were behind-the-meter, 4 kW, 10 kWh, lithium-ion battery energy storage systems with built-in PV inverters, installed in 14 single family faculty home garages on the University of California, Irvine campus, and connected directly to each home's electrical distribution panel and photovoltaic ("PV") array. The RESUs were installed as part of the ISGD project, and were operated in several different modes, including: 1) secure load backup, 2) time-based load shifting, 3) price-based load shifting, 4) var support, 5) level demand, and 6) as simple PV inverters.

The secure load backup mode allowed the RESUs to continue powering the home's refrigerator and garage door opener in the event of an unexpected power outage, and successfully performed this function during two such outages during the course of the project. The time and price-based load shifting modes charged the RESUs off peak, and discharged them on peak, based on a fixed schedule or price signals, respectively. The RESUs also briefly provided var support to impact the neighborhood distribution voltage, and employed an algorithm to automatically attempt to level, or normalize, each home's electric demand over the course of a day. The RESUs also had a built-in PV inverter, and were capable of providing PV power to the home and/or use it to charge the batteries, instead of using grid power.

The RESUs were ultimately capable of performing each of the intended operating modes, had the ability to significantly affect each home's electric bill, and made a significant contribution toward achieving zero net energy (in addition to other measures such as energy efficiency upgrades). However, due to the complexity and early status of the RESU technology and integration, the devices exhibited a number of operational issues in areas including home networking, smart meter pairing, price signaling, operational stability, and a few component failures. The RESUs required a high level of remote and on-site support by SCE engineers and the manufacturer, and were removed at the conclusion of the ISGD project.

Small Utility-owned Distribution Energy Storage

Note: This is an example of the application (1) as described in Question 5.

The Small Utility-owned Distribution Energy Storage (SUDES) device is a 25 kVA, 50 kWh lithium-ion battery energy storage system connected to the 120/240 volt secondary of a residential distribution transformer serving nine single family faculty homes on the University of

California, Irvine campus. The SUDES was installed as part of the ISGD project, and was operated in three modes: 1) peak load shaving, 2) permanent load shifting, and 3) islanding.

In the peak load shaving mode, the system discharged as needed to "shave" the daily peak load on the local distribution transformer. For the permanent load shifting mode, the system operated on a time-based schedule that charged the system during off peak hours and discharged the system during on-peak hours, regardless of the load on the distribution transformer. For the islanding mode, the system disconnected from the grid and directly powered the nine homes, including a smooth transition from net consumption (discharging the battery to meet all home load) to net generation (charging the battery with excess PV generation coming from the homes).

The system successfully completed all experiments, including seamlessly disconnecting and reconnecting to the grid during the islanding test. However, the islanding experiment was carefully planned in advance, since the SUDES device is limited by its battery capacity; if the homes use more energy than the battery has available charge while islanded, or, if the homes generate more energy than the battery has capacity to store while islanded, the CES would be forced to trip off line. This demonstrates some of the dynamics and considerations for distributed generation, micro grids, and islanding. Also, the system encountered a few issues related to remote control and communications, and operation at low battery state of charge. Furthermore, due to the system's close proximity to the homes, project management was concerned the high frequency inverter noise may disturb customers, especially if the system was operated a full power in the middle of the night. An engineered sound enclosure was proactively designed, but was ultimately not needed or installed. The SUDES device remains in-place after the conclusion of the ISGD project, and SCE plans to use it as part of the upcoming Integrated Grid Project ("IGP").

Distribution Battery Energy Storage System

Note: This is a (larger) example of the application (1) as described in Question 5.

The Distribution Battery Energy Storage System ("DBESS") was a containerized 2,000 kVA, 500 kWh lithium-ion battery energy storage system ("BESS") connected to the Arnold 12 kV distribution circuit out of MacArthur Substation. The DBESS was temporarily installed on the University of California, Irvine campus as part of the ISGD project, and was operated in support of two distinct subprojects: 1) Distribution Circuit Constraint Management Using Energy Storage, and 2) Deep Grid Situational Awareness.

For the first subproject, the system discharged as needed to prevent distribution circuit load from exceeding a specified threshold. The system discharged as expected, but was limited by its energy capacity (500 kWh) and was only able to discharge for a short duration (this was expected, since the system was originally designed for a different application, frequency regulation, which is characterized by high power, short duration charges and discharges).

For the second subproject, the system followed different charge/discharge profiles (*e.g.*, impulse, step, ramp, saw tooth) at different magnitudes and durations to affect the load on the distribution circuit. Researchers at the University of California, Irvine then developed an algorithm to

automatically detect these charges and discharges as recorded by a phasor measurement unit ("PMU") at upstream distribution and transmission-level substations. The objective of the algorithm was to detect and confirm aggregated demand response ("DR") dispatches at a single location, rather than having to individually meter each DR resource.

The system completed all project experiments, but had a number of cooling, battery management, and power conversion system component failures that limited its availability, or power and energy capacities. The system was removed at the conclusion of the ISGD project.

Distribution Energy Storage Integration 1

Note: This is a (larger) example of the application (1) as described in Question 5.

Distribution Energy Storage Integration (DESI) 1 is a 2,500 kVA, 3,900 kilowatt-hour (kWh), lithium-ion battery energy storage system (BESS) connected to the Scarlet 12 kV distribution circuit out of Orange Substation. DESI 1 is SCE's first pilot production (non-research and development) BESS, and is designed to support grid operations.

Purpose and Location

The Scarlet 12 kV distribution circuit serves various commercial and industrial customers in the City of Orange. One customer, NOV (formerly National Oilwell Varco), manufactures large drill bits for offshore oil platforms. Part of the manufacturing and delivery process includes time-critical testing the drill bits in one of several on-site test bays. During testing, each drill bit can add several megawatts of load to the NOV service, typically during on peak periods. These large increases in demand can potentially cause the Scarlet 12 kV distribution circuit to reach or exceed its planned loading limit ("PLL") during summertime peak load conditions.

Rather than pursue traditional methods of adding capacity to the circuit, SCE decided to pilot its first production distribution BESS. The BESS has several operating modes, but is primarily designed to monitor the Scarlet 12 kV distribution circuit phase current and discharge as needed to prevent the current from exceeding the PLL. The customer provided an easement for the BESS inside their existing fence line, and for interconnection facilities on the adjacent parkway.

Procurement and Construction

DESI 1 was procured as a turn-key system, where the manufacturer was responsible for providing a complete, integrated, operational BESS, as well as ongoing maintenance and warranty services per SCE specifications. SCE was responsible for providing the interconnection facilities, location, and site preparations necessary to receive the BESS. SCE released a request for proposal in early 2014, and awarded a contract to NEC Energy Solutions in July 2014. Construction of interconnection facilities and site preparations started in early 2015, and the manufacturer completed system commissioning and associated tests in May 2015. NEC Energy Solutions achieved Substantial Completion on May 22, 2015, when SCE took operational control of the system.

Status

SCE has been conducting the Local Load Limiting operation since July 15, 2015, to limit the impact of customer activities on the distribution circuit. Under this operation, the system charges daily at limited power during an off peak period, and then discharges as needed to prevent the customer load from exceeding a specified threshold. SCE plans to install a meter in early 2016 that measures the entire distribution circuit, so the BESS can discharge as needed to keep the circuit from exceeding the PLL. Compared to previous RD&D systems, DESI 1 has been relatively reliable and has dispatched when needed to support grid operations. However, several issues have been identified with the power conversion system (inverter), which the manufacturer is addressing and SCE will consider in future energy storage design specifications.